

A new record of mass occurrence of *Pseudopomyza atrimana* (Meigen), with notes on probable breeding habitat of the species (Diptera: Pseudopomyzidae)

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A new record of mass occurrence of *Pseudopomyza atrimana* (Meigen), with notes on probable breeding habitat of the species (Diptera: Pseudopomyzidae). – Čas. Slez. Muz. Opava (A), 61: 3-10, 2012.

Abstract: A mass occurrence of adults of *Pseudopomyza atrimana* (Meigen, 1830), the only European representative of the family Pseudopomyzidae, on heaps of rotten cut grass in woodland areas of the Muránska planina National Park (Slovakia) is described. All available biological information on the species is summarized and probable breeding substrates are discussed. Frequent mating of *P. atrimana* on rotten grass was observed and photographed.

Keywords: Diptera, Pseudopomyzidae, *Pseudopomyza atrimana*, habitat, mass occurrence, mating, Slovakia

Introduction

Pseudopomyza atrimana (Meigen, 1830) is the only representative of the family Pseudopomyzidae in Europe (Merz & Shatalkin 2004; Roháček 2009a). Interestingly, its closest relatives, also belonging to the nominate subgenus *Pseudopomyza*, are hitherto only known from New Zealand (McAlpine 1994). There are scattered records of *P. atrimana* from European countries, viz. Austria, Great Britain, Czech Republic, Finland, Germany, Hungary, Norway, Poland, Romania, Russia (CET, NET), Slovakia, Switzerland (Merz & Shatalkin 2004) and the species is also known from Moldavia (Ceianu 1989), Tenerife (Buck 1996), Italy and Sweden (von Tschirnhaus 2008), The Netherlands (van Zuijlen 2009; Belgers 2010) and Spain (Ventura Pérez 2010). Because the species is also known from the East Palaearctic, viz. Russia (FE: Amur area) and Korea (see McAlpine & Shatalkin 1998), its distribution can be characterised as transpalaearctic. Almost all previous records of *P. atrimana* are based on single or a few specimens; only Schacht (1997, 2004) and Stuke (2009) reported about larger numbers of collected specimens.

The biology of the Palaearctic species of Pseudopomyzidae is reviewed by McAlpine & Shatalkin (1998) who stated that it is very little known. This is particularly true for *Pseudopomyza atrimana* where the breeding substrate of larvae as well as the preferred habitat of the species remain unknown. Based on Frey's (1952) record of adults swarming over tree logs it was presupposed that *P. atrimana* could develop under bark of dead trees, like *Polypathomyia stackelbergi* Krivosheina, 1979 being the only species of the family where the habitat of larva is known (see Krivosheina 1979, 1984). This hypothesis has been generally accepted (McAlpine & Shatalkin 1998; Oosterbroek 2006; Roháček 2009a; Ventura Pérez 2010).

In June 2012 a number of specimens of *P. atrimana* was collected in the Muránska planina National Park (Slovakia) in an unexpected microhabitat (for detail see below) and, interestingly, the finding was repeated under similar circumstances in a second locality in this territory a month later. Because of the new records of mass occurrence of *P. atrimana* all previous biological data on the species are summarized, compared with the new information recently obtained and the habitat and probable breeding substrate of the species are discussed.

Results of this paper form a part of the research of Diptera in the Gemer area (see Ševčík & Kurina 2011a, b; Roháček 2011; Roháček & Ševčík 2011; Ševčík 2011).

Material and methods

All the material examined is dry mounted and deposited the Slezské zemské muzeum, Opava, Czech Republic. Macrophotographs of living specimens of *P. atrimana* were taken in special boxes by means of digital camera Canon EOS 60D with macro lens (Canon MP-E 65 mm 1–5x) and ring macro flash (Canon MR-14ex).

Results

Pseudopomyza atrimana (Meigen, 1830)

(Figs 1-3, 5)

Material examined: SLOVAKIA: Muránska planina NP, Patina gamekeeper's lodge, 48°47'10"N, 19°56'11"E, 800 m, on heap of cut grass, 24.vi.2012, 10♂7♀; Muránska planina NP, Zlatno E margin, 48°49'40"N, 20°05'17"E, 745 m, on heap of cut grass, 26.vii.2012, 19♂17♀ (1♂1♀ in cop.), all J. Roháček leg. and det.

Microhabitat: In both localities the heaps of cut grass were situated at shaded or semi-shaded situations, either on the margin of a mixed forest with spruce predominating (Patina, Fig. 4) or below alder trees at the margin of a small creek (Zlatno, Fig. 6). However, also at Patina a montane creek was not far from the heap (some 50 m). The heap at Patina was very large (about 3 x 4 m, almost 1 m high); a month later it became markedly reduced due to the decaying process to less than 0.5 m height (Fig. 4). The heap at Zlatno was relatively small (2 x 1.5 m, height about 0.2 m, Fig. 6). The cut grass in both heaps was in an early stage of decomposition when it characteristically smells and is most attractive to adult flies.

In the first locality (Patina) *P. atrimana* was collected in the company of sphaerocerids *Leptocera fontinalis* (Fallén, 1826), *L. nigra* Olivier, 1813, *Eulimosina ochripes* (Meigen, 1830) and *Gonioneura spinipennis* (Haliday, 1836) while in the second site (Zlatno) it co-occurred with *Ischiolepta pusilla* (Fallén, 1820), *Leptocera fontinalis* (Fallén, 1826), *Minilimosina fungicola* (Haliday, 1836), *Pullimosina vulgesta* Roháček, 2001, *Coproica vagans* (Haliday, 1833), *C. hirticula* Collin, 1954 and *C. sp. cf. rohaceki*. Also *Scaptomyza* species (Drosophilidae) were noted (but not collected) on both heaps.

On the second visit at the first locality (on 26.vii.2012), a month after *P. atrimana* was found here, the grass has already strongly decayed (Fig. 4) and no specimen of this species was found on the heap. The sample collected only included a number of species of Sphaeroceridae, viz. *Ischiolepta pusilla* (Fallén, 1820), *Bifronsina bifrons* (Stenhammar, 1855), *Pullimosina heteroneura* (Haliday, 1836), *P. vulgesta* Roháček, 2001, *Opalimosina (Pappiella) liliputana* (Rondani, 1880), *Opalimosina (s. str.) mirabilis* (Collin, 1902), *Trachyopella kuntzei* (Duda, 1918), *T. lineafrons* (Spuler, 1925), *Coproica ferruginata* (Stenhammar, 1855) and *C. hirticula* Collin, 1956, but also single or a few specimens of *Desmometopa sordida* (Fallén, 1820) (Milichiidae), *Stiphrosoma laetum* (Meigen, 1830) (Anthomyzidae) and 2 species of *Drapetis* (Hybotidae).

Mass occurrence: All the specimens were netted when disturbed from the heap of grass by repeated treading on the substrate (Fig. 6). Some adults were also seen running among stems of rotting grass but it was difficult to collect them directly by an aspirator. The number of specimens preserved for collection surely is only a small portion of the real amount occurring in the grass heaps. On the first occasion (Patina) only a smaller sample was taken because the species was not recognized in the net in the field and was considered to be a sphaerocerid



Figs 1-3: Adults of *Pseudopomyza atrimana* (Meigen, 1830) on rotting grass stems. 1 – a mating pair attacked by a second male; 2 – a male; 3 – a bubbling female. Body length of specimens 1.7-2.0 mm. Photo by J. Roháček.

(*Spelobia luteilabris* or *Eulimosina ochripes*). In fact *P. atrimana* had evidently predominated in numbers over all sphaerocerids together there. Following this knowledge the species was identified in the field in the second case (Zlatno) and a larger series of specimens was selectively collected; *P. atrimana* formed at least one third of all adult flies netted from above the heap there. It can be estimated that on the larger heap at Patina several hundred specimens of *P. atrimana* occurred because even on the small heap at Zlatno surely more than one hundred adults could be collected. Mating of adults was commonly observed in the net and collecting tubes (Zlatno) and the coupled flies were photographed (Figs 1, 5) and one pair had even remained in copula after being killed.

Discussion and conclusions

Mass occurrence. Schacht (1997, 2004) was the first to collect a larger amount of specimens (almost 200) of *P. atrimana* in Bavaria (Germany), which were caught on blossoming goldenrods *Solidago canadensis* and *S. gigantea* at paths and on clearings within forests. A similar occurrence on flowering umbellifers *Anthriscus sylvestris* and *Chaerophyllum temulum* was observed by J.-H. Stuke in forests of Lower Saxony (Germany) (von Tschirnhaus 2008; Stuke 2009). However, contrary to the above records, these mass occurrences were surely not associated with a breeding substrate.

Habitat. Hitherto, a very limited information about the habitat association of *P. atrimana* was published. Usually the single specimens were netted, swept or caught in Malaise, beer or pan traps in woodland and park areas, often in valleys near creeks or other water sources (see Chandler 1983; Roháček 1987, 1995, 2009b; Godfrey 1994; Papp 2003, 2009; Roháček et al. 2005; von Tschirnhaus 2008; van Zuijlen 2009; Ventura 2010; also Barták, pers. comm. 2012). The first more detailed knowledge about microhabitat of this species was provided by Frey (1952: 8) who observed and collected adults swarming above fallen tree trunks. There is no information about the condition of these trunks but possibly they were relatively freshly cut as were those from which specimens of *P. atrimana* were recorded by Merz (1998) and Roháček (2009b, on cut alder trunks). D. Gavryushin (in litt.) also observed and photographed adults of the species on exposed wood of a freshly broken birch tree at Naro-Fominsk (Moscow region, Russia)*.

On the other hand, there are also a few published data recording the species from rotting vegetation. Roháček (1981) swept a specimen on a pile of decayed vegetation at the Slaná river (Slovakia) and Papp (1998) on rotten hay in Hungary. Most recently, Belgers (2010) recorded a pair of specimens found under oak boards laid on a garden compost heap in Wageningen (The Netherlands). This record is particularly interesting regarding the very late date of collection (12-13.xi.2010). In April 2012 D. Belgers (pers. comm. 2012) found there about 20 additional specimens (only 5 specimens from 10.iv. were collected), which he believed to have emerged from decayed plant material that predominated in the compost. These records match closely to the new findings from the Muránska planina N.P. except for the fact that formerly less specimens were collected from this substrate. It is interesting to note that also the adults of the brachypterous relative from southern islands of New Zealand, *Pseudopomyza brevis* (Harrison, 1976), were found under plant litter (Harrison 1976).

*see http://www.diptera.info/photogallery.php?photo_id=6465



Figs 4-6: Habitat and adults of *Pseudopomyza atrimana* (Meigen, 1830). 4 – a large heap of rotten grass at Patina (a month after *P. atrimana* was collected); 5 – two mating pairs on stems of decayed grass (body length of specimens 1.6-2.1 mm); 6 – a smaller heap of rotten grass at Zlatno with author collecting the flies. Photo by J. Roháček (Figs 4, 5) and J. Ševčík (Fig. 6).

Breeding substrate or only an attractant to adults ? Based on the above habitat records of adult *P. atrimana*, two kinds of potential substrate for larval development can be considered: (1) dead trunks of deciduous trees (under bark) and (2) rotting vegetation (cut grass etc.). The first alternative seems to be supported by the fact that a related *Polypathomyia* species develops under bark of rotten trees (Krivosheina 1979). On the other hand, adults of *P. atrimana* were only collected on freshly cut logs, on debarked wood, often together with *Chymomyza* species (Drosophilidae) (D. Gavryushin in litt., J. Roháček unpublished) which seems to indicate that they are only attracted to them and may be feeding on sap from this wood like these drosophilids. Moreover, based on my many years experience with collecting of Clusiidae, *P. atrimana* cannot be found on older decaying fallen tree trunks and, hence, hardly can develop in them.

The mass occurrence of *P. atrimana* on heaps of moderately rotten cut grass is surely caused by the high attractiveness of this substrate. A heap, situated in woodland habitat where the species lives, can serve as an extraordinarily large supply of food both to adults and larvae compared to other breeding possibilities in the site. It is therefore understandable that adults are allured from a wide vicinity and can accumulate in such microhabitat. However, without rearing adults directly from the substrate we cannot demonstrate that the larvae develop in it with certainty. The frequent mating of flies (Figs 1, 5) on rotten grass can be an indication of subsequent oviposition in this substrate but the possibility that fertilized females may leave the habitat for oviposition elsewhere also cannot be excluded. Despite all these facts it seems to me that rotten vegetation as the breeding substrate of *P. atrimana* is more likely, particularly when the records of Belgers (2010 and in litt.) from compost (see above) are considered.

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Nové zjištění hromadného výskytu druhu *Pseudopomyza atrimana* (Meigen) s poznámkami k pravděpodobnému stanovišti vývoje tohoto druhu (Diptera: Pseudopomyzidae)

Jsou prezentovány nové údaje o masovém výskytu dospělců druhu *Pseudopomyza atrimana* (Meigen, 1830) na hromadách posečené tlející trávy v lesních oblastech severní části národního parku Muránska planina (Slovensko). Je podán přehled všech dostupných informací o bionomii tohoto druhu, jediného zástupce čeledi Pseudopomyzidae v Evropě. Na základě jejich srovnání s novými poznatky jsou diskutovány jak upřednostňovaný biotop tohoto druhu, tak i pravděpodobný mikrohabitat a substrát, kde se mohou vyvíjet jeho larvy. Bylo pozorováno a vyfotografováno časté páření dospělců druhu *P. atrimana* mezi stébly hniloucí trávy.

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